

# The Fall and Rise of Vertical Coordination in Commodity Chains in Developing and Transition Countries

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*“Private agricultural marketing companies have become dominant providers of smallholder input credit in Sub-Saharan Africa. In various countries of the region, they are today in practice the sole providers of seasonal input advances to the small-scale farming community.”*

*IFAD (2003, p.5)*

*“Trade credit from private suppliers comprised virtually all of the family farm credit and the biggest share of liabilities of agricultural companies [in Lithuania in 2004].”*

*World Bank (2005)*

*“69% of 35 billion \$ credit in the Brazilian agri-food system is supply-chain credit”*

*D. Alcantara, Managing Director, Banco do Brasil (March 2004)*

## ABSTRACT

Food and agricultural commodity supply chains in developing and transition countries have undergone tremendous changes in the past decades. An important part of these changes is the decline of state-controlled vertical coordination in commodity chains in the 1980s and 1990s and the emergence and spread of private sector driven vertical coordination in more recent years. In this paper we explain the causes of these changes, illustrate their importance, discuss the implications for efficiency and equity, and provide empirical evidence on these effects from several case-studies in developing and transition countries.

## INTRODUCTION

Twenty-five years ago, a vast share of the poor and middle income countries, covering a large share of the world’s agricultural areas and farmers, were characterized by state-controlled supply chains for agricultural and food commodities. This was most extreme in the Communist world, spreading from Central Europe to East Asia, where the entire agri-food system was under strict control of the state. However, also in many African, Latin-American and South Asian countries the state played a very important role in the agri-food chains. For example, in Brazil and Mexico, wholesale markets were run by the state (Reardon and Swinnen, 2004); in South Asia the state heavily regulated food markets and many African commodity markets and trade regimes were controlled by (para-)state organizations. In many of these countries, the state played an important role in agricultural production and marketing in the decades after independence from colonial power. Governments in Sub Sahara Africa (SSA) and South Asia were heavily involved in agricultural marketing and food processing through the creation of marketing boards, government-controlled cooperatives and parastatal processing units. These

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government institutions were often monopoly buyers of agricultural products, especially for basic food crops and important export crops.<sup>30</sup>

This system of state intervention and control and, with it, the vertical coordination has undergone tremendous changes in the 1980s and the 1990s as a global process of liberalization induced dramatic changes in many of these regions<sup>31</sup>. In the transition world, the liberalization of prices, trade and exchanges, the privatization of the state enterprises etc. removed much of the state control over the commodity chains as well as the vertical coordination in the chains. Similar processes of privatization and liberalization of domestic and international commodity and financial markets reduced the control of the state and vertical coordination in many developing and emerging economies.

Moreover, processes of globalization have at the same time induced changes in the governance structure of food chains. This globalization of the food chains in transition and developing countries has (partly) been driven by the liberalization of the trade and investment regimes in transition and developing countries – policy reforms which often accompanied the privatization and domestic price reforms – and the spread of food standards.

First, trade liberalization caused major changes in trade of agri-food products. For example in Central and Eastern Europe it caused a major reorientation of the agri-food trade from “east to west”, i.e. from trade with the former Soviet countries to trade with western Europe, and a shift of the agri-food trade position from net exporters to net importers. Also the participation of developing countries in world agricultural trade has increased. In addition, also the structure of world agriculture trade changed considerably during the past decades. There has been an increase in the share of high-value products – mainly fish and fishery products, and fruits and vegetables – in world agricultural trade. Especially developing countries experienced a sharp increase in such high-value exports while the importance of their traditional tropical export commodities – such as coffee, cocoa, and tea – has decreased (Aksoy, 2005).

Second, the liberalization of the investment regimes induced foreign investments in agribusiness, food industry, and further down the chain, with major implications for farmers (Dries and Swinnen, 2004). Several food sectors in Eastern Europe, such as the sugar, dairy, and retail sector, have received massive amounts of foreign investment, which now holds dominant market shares. A well-advertised example of these investments is the rapid growth of modern retail chains (“supermarkets”) in transition and (some) developing countries and which was triggered by the reform process in former state-controlled economies (Reardon and Swinnen, 2004).

Third, associated with these changes is the spread of (private and public) food standards. Consumers are increasingly demanding specific quality attributes of processed and fresh food products and are increasingly aware of food safety issues. Food-standards are increasingly stringent, especially for fresh food products such as fruit and vegetables, meat, dairy products, fish and seafood products, which are prone to food safety risks. These food quality and safety demands are most pronounced in western markets (and increasingly also in urban markets of low-income countries) and affect traders and producers in transition and developing countries through international trade.

<sup>30</sup> For example, in Indonesia marketing of rice was controlled by the state through the marketing board BULOG (National Logistical Supply Organization). Similarly, marketing of grain and other basic food crops was controlled and organized by government marketing boards e.g. in Malawi, through ADMARC (Agricultural Development and Marketing Corporation); in Zambia, through NAMBOARD (National Agricultural Marketing Board) and in Kenya through NCPB (National Cereals and Produce Board). Also marketing and processing of major export crops was in many countries state-controlled through state-owned processing and exporting companies and organizations; e.g. for cotton in Malawi, through CMDT (Malawi Textile Development Company), in Cameroon, through SODECOTON, in Ghana, through the Ghana Cotton Development Board and in Kenya through CLSMB (Cotton Lint and Seed Marketing Board); for tea in Kenya, through KTDA (The Kenyan Tea Development Cooperation); for coffee through coffee marketing boards in Uganda, Kenya, Zimbabwe and Ethiopia; etc.

<sup>31</sup> In the so-called Berg report of 1980, the World Bank argued that government marketing organizations should be reformed to operate on a commercial basis and the private sector should be permitted to enter agricultural marketing systems to provide competition and encourage efficiency. This report laid the basis for economic reforms, including privatization and market liberalization, which started in the late 1980s and continued throughout the 1990s in many developing countries. The transition reforms actually started in 1978 in China and after 1989 in Europe.

Following the privatization, liberalization and globalization waves, new, private forms of vertical coordination (VC) have emerged and are growing (Swinnen, 2005, 2006). This paper analyzes and documents the fall of state-controlled VC and the rise of private VC and presents evidence on its effects in transition and developing countries.

## SOME CONCEPTS

Vertical coordination can take various forms, which can be thought of as institutional arrangements varying between the two extremes of spot market exchanges (0) and full ownership integration (1). Within this 0-1 interval, there is a large variety of different forms of coordination and an equally vast literature trying to classify and explain these various forms<sup>32</sup>. An often made distinction, which is useful for our purposes, is between marketing contracts and production contracts. *Marketing contracts* are agreements between a contractor and a grower that specifies some form of a price (system) and outlet ex ante. *Production contracts* are more extensive forms of coordination and include detailed production practices, extension services, inputs supplied by the contractor, quality and quantity of a commodity and a price.<sup>33</sup>

Key factors determining the use of various contract forms or other forms of vertical coordination are the costs and uncertainties involved in the transactions, which themselves are affected by the economic and institutional environment, the need for asset- or transaction-specific investments, the frequency of interacting, commodity characteristics such as perishability, costs of measuring and monitoring product characteristics, uncertainty over product quality, or reliability of supplies.<sup>34</sup>

In the literature, VC in state-controlled systems is sometimes referred to as outgrower schemes while private sector VC initiatives are referred to as contract-farming (e.g. Little and Watts, 1994). We roughly stick to this terminology but indicate that the distinction is not always straightforward. The public-private dichotomy is complex: a state-controlled VC scheme may be under private management or a private VC scheme may be supported by subsidies and public extension and research.

## A HISTORICAL PERSPECTIVE ON THE FALL AND RISE OF VERTICAL COORDINATION

### *State-controlled vertical coordination*

Vertical coordination (VC) was widespread in state-controlled food supply chains. Again this was most extreme in the Communist system where production at various stages and the exchange of inputs and outputs along the chain was coordinated and determined by the central command system. The agricultural supply system was fully integrated and completely state-controlled (Rozelle and Swinnen, 2004). Production, processing, marketing, the provision of inputs and credit, retailing, etc were all directed by the central planning authorities. Although there were some variations in countries in the extent and scope of control, this was the basic system extending from Central Europe, the Soviet Union to China and Viet Nam.

However also in other regions where the state played an important role in food chains vertical coordination was widespread. For example, many of the African parastatal organizations provided

<sup>32</sup> There is a significant literature on supply chains and contracting in food chains, some of it on developing and transition countries (see World Bank (2005) for a survey). There is also a related, mostly theoretical, literature which focuses on optimal contracting and interlinked markets in developing countries (e.g. Bardhan, 1989).

<sup>33</sup> There is important variation within "production contracts". For example production contracts which provide inputs, credit and some extension to farmers is the most common form of state-controlled VC in developing countries, while production contracts in private VC, especially in the case of high-value products, sometimes go much further in their technical assistance and include also certain management decisions (such as timing of planting & harvesting; timing, quantity and type of fertilizer application, etc).

<sup>34</sup> The basic explanations draw often on the seminal work of Ronald Coase and Oliver Williamson. However, in two recent surveys of the literature (Hobbs and Young, 2001; and Rehber, 2000) no less than seven different strands of literature are identified as being important to understand and explain those differences: transaction costs economics, agency theory, competency/capability models, strategic management theory, convention theory, life-cycle theory, and contract economics.

both inputs to farmers and purchased their outputs. Government marketing organizations and parastatal processing companies used VC systems with upstream suppliers. The dominant form of state-controlled VC was that of seasonal input and credit provisions to small farmers in return for supplies of primary produce. In fact, state-controlled VC was often the only source of input and credit provision for peasant farmers (IFAD, 2003). For example, the government marketing boards ADMARC in Malawi and NAMBOARD in Zambia provided seasonal inputs to peasant farmers deducting the value of the inputs from the payment made for marketed output at harvest time (Poulton et al., 1998). Also parastatal cotton companies such as CMDT in Mali, SODECOTON in Cameroon and the Ghana Cotton Development Board in Ghana provided credit and inputs to cotton farmers (Poulton et al., 1998). Also extension services were offered by the government, either implicitly within VC of marketing boards and parastatal processing companies – e.g. the Ghana Cotton Development Board – or through other channels. Also more complex and extensive systems of state-controlled VC existed. For example, the Ghana Cotton Development Board also provided extension services (Poulton, 1998) and the Kenyan Tea Development Cooperation was involved in effective control at all levels of the operation including planting material, production processes, quality control and extension services (Bauman, 2000).

In many SSA countries, state-controlled VC has been particularly important – and still remains important in some countries. For example in Kenya, by the mid-1980's more than 230,000 rural households, or about 16% of the rural population, were involved in outgrower schemes with large parastatal companies and government marketing boards for the production and marketing of tea, sugar, oilseeds and tobacco (Baumann, 2000).

State-controlled VC in centralized agricultural marketing systems in developing and Communist countries was often motivated by political motives and by objectives to provide cheap food for urban markets; the maximization of foreign exchange earnings; the creation of rural employment; ascertaining the viability of certain businesses; etc. State-controlled VC was often viewed as a way to protect peasant farmers and stimulate rural development.

Most analyses point at the deficiencies and inefficiencies of these systems. For example, the inefficiency in the processing, agribusiness, and marketing systems and in the central allocation of production factors are considered one of the primary causes of the inefficiency of the Soviet farming complex (Johnson and Brooks, 1983; Swinnen and Rozelle, 2006). Also in Africa, several studies conclude that state-controlled outgrower schemes were inefficient and poorly managed, which manifested itself, among other things, in low credit repayment rates (Warning and Key, 2002)<sup>35</sup>.

### ***Liberalization, privatization, and the break-down of vertical coordination***

This system of vertical coordination has undergone tremendous changes in the 1980s and the 1990s. In the transition world, the liberalization of exchange and prices, and the privatization of farms and enterprises caused the collapse of vertical coordination and caused major disruptions in the food chain. These effects occurred most dramatically in the collapse of the state-controlled system in Central and Eastern European countries and the former Soviet Union.<sup>36</sup> Widespread forms of contract problems occurred such as long payment delays, non-payments for delivered products or non-delivery. Payment delays were a major problem for companies in Eastern European countries and caused major drains on much needed cash flow for farmers. Food companies in Eastern Europe in the late 1990s considered late payments one of their most important obstacles to growth (Gorton et al, 2000).

The disruptions in relationships of farms with input suppliers and food companies also resulted in many farms facing serious constraints in accessing essential inputs (feed, fertilizer, seeds, capital,

<sup>35</sup> Some studies also point at successful state-controlled VC. For example, Poulton et al. (1998) point to some large government outgrower schemes in a poor district in Malawi, which were successful in achieving very high repayment rates. Also the outgrower schemes of the Kenyan Tea Development Authority are referred to as a success story, which is attributed to its extensive form of VC (Bauman, 2000).

<sup>36</sup> Interesting, the early Chinese liberalization of the marketing and input supply system also led to major exchange problems, which caused the Chinese government to make a U-turn on the reforms and reimpose state control on the marketing and fertilizer supply systems, which was then gradually liberalized much later (see Rozelle (1996) for an extensive discussion, and Rozelle and Swinnen (2004) for a summary).

etc.). Also in many developing countries privatization and market liberalization led to the decline of input and credit supply to farms as it disrupted the working of various government-controlled agricultural institutions, cooperative unions and parastatal processing companies.<sup>37</sup> As government marketing boards and cooperatives have ceased to play a major role in the procurement of agricultural produce, so has the provision of credit and agricultural inputs through state-controlled VC. In addition, market liberalization led to the removal of price supports and input subsidies, a reduction in government research and extension services, and a decline in government (subsidized) credit to the agricultural sector.

### ***The emergence of private vertical coordination***

However, following privatization and liberalization, new forms of vertical coordination have emerged and are growing (IFAD, 2003; Swinnen, 2006; World Bank, 2005). New forms of vertical coordination are no longer state-controlled but are introduced by private companies. Private traders, retailers, agribusinesses and food processing companies increasingly contract with farms and rural households to whom they provide inputs and services in return for guaranteed and quality supplies. This process of interlinked contracts is growing rapidly in the transition and developing world.

The emergence and spread of private VC is caused by the combination of, on the one hand, an increasing demand for products of high quality and safety standards with private sector investments and increasing consumer incomes and demands (both domestically and through trade) and, on the other hand, the problems which farms face to supply such products reliably, consistently and timely to processors and traders due to a variety of market imperfections and poor public institutions.

Farmers in developing and transition countries face major constraints in realizing high-quality, consistent supplies. These include financial constraints as well as difficulties in input markets, lack of technical and managerial capacity etc. Specifically for high-standards products, farmers might lack the expertise and have no access to crucial inputs such as improved seeds. To guarantee consistent and quality supplies, traders and processors engage in VC to overcome farmers' constraints.

The importance of VC in developing and transition countries is further explained by the lack of efficient institutions and infrastructure to assure consistent, reliable, quality and timely supply through spot market arrangements. VC is in fact a private institutional response to the above described market constraints. To overcome problems of enforcement and constraints on quality supplies, private VC systems are set up by processors, traders, retailers and input suppliers.

Increasing consumer demand for quality and food safety is another driving force behind private VC in transition and developing countries. Investment by modern processors and retailers (supermarket chains) reinforces the need for supplying large and consistent volumes by their use of private standards and requirements of extensive supervision and control of production processes.

Emerging empirical evidence suggests that these new forms of private VC can be an engine of economic growth, rural development and poverty reduction. The next section presents evidence on its effects in transition and developing countries.

### ***The Importance of Private Sector Vertical Coordination***

The importance of private VC is increasing in developing and transition countries. At the end of the 1990s, in the Czech Republic, Slovakia and Hungary, 80% of the corporate farms, who dominated farm production in these countries, sold crops on contract, and 60-85% sold animal products on contract; numbers which are considerably higher than the shares of farms in the US and the EU (table 1). A survey of agri-food processors in five CIS countries (Armenia, Georgia, Moldova, Ukraine and Russia) found that food companies which used contracts with suppliers grew from slightly more than one-third in 1997 to almost three-quarters by 2003 (table 2).

<sup>37</sup> For example in Kenya, the economic reforms have led to the collapse of the National Cereals and Produce Marketing Board, the Cotton Lint and Seed Marketing Board, the Kenya Grain Growers Cooperative Union, etc. (IFAD, 2003).



**Table 1: Share of farms selling on contract in Central Europe (as % of total)**

Type of Contract	Czech		Slovak	Hungary	Bulgaria
	NRIF*	RIF*			
<i>Individual farms</i>					
Selling crop products on contract	4	37	29	8	5
Selling livestock products on contract	1	13	4	10	3
Selling animals on contract	2	7	6	na	na
Selling on contract	5	46	35	17	7
<b>Corporate Farms</b>					
Selling crop products on contract		79	82	86	42
Selling livestock products on contract		73	83	59	23
Selling animals on contract		49	77	na	na
Selling on contract		96	98	94	43

\*RIF = Registered individual farms ; NRIF= non-registered individual farms

Source: Swinnen, 2005

**Table 2: Supply relationships in sourcing raw materials in Armenia, Georgia, Moldova, Ukraine and Russia, 1997-2003 (% of companies)**

Relationship	1997	1999	2001	2003
<b>Spot Markets</b>				
With all farmers	27.2	43.5	47.1	50
With small farmers	25	41.3	44.2	47.2
With larger farmers	15.6	25.5	25.5	23.1
<b>Contracts</b>				
With all farmers	41.3	61.7	73.1	77.4
With small farmers	36.2	43.8	46.2	49.1
With larger farmers	37	58.3	69.2	73.6
Own farms	6.4	8.3	17.8	26.4
Other agents	16.7	28.6	46.2	49.1

Source: White and Gorton, 2004

**Table 3: Farm assistance programs offered by dairy companies in Central Europe**

Company Name	Credit – specific	Credit - general	Input supply	Extension service	Veterinary service	Bank loan guarantee
<b>POLAND**</b>						
Mlekpól	Y		Y	Y	N	Y
Mleczarnia	N		Y	N	N	Y
Kurpie	Y		Y	Y	N	Y
Mazowsze	Y		Y	Y	N	N
ICC Paslek	Y		Y	Y	N	Y
Warmia Dairy	Y		Y	Y	Y	Y
<b>BULGARIA</b>						
Merone	Y(2000)	N	Y(???)	Y(1992)	N	N
Fama	Y(1994)	N	Y(1994)	N	N	Y(once)
Mlekimex	Y(1997)	Y(1998)	Y(1997)	Y(1999)	Y(1997)	Y(1998)
Danone	Y(1997)	N	Y(1998)	Y(2000)	Y(1995)	Y(1999)
Iotovi	N	N	Y(1995)	N	N	Y(1995)
Milky World	Y(1999)	Y(2000)	Y(1999)	Y(1999)	N	Y(1999)
Markelli	Y(1999)	N	Y(1998)	N	N	N
Mandra Obnova	Y(1998)	N	Y(2000)	Y(2000)	N	N
Meggle	Y(2001)	N	Y(2001)	Y(2001)	N	N
PRL	N	N	N	Y(2002)	N	N
Serdika 90	Y(1997)	N	Y(1997)	Y(1997)	N	N
<b>SLOVAKIA</b>						
Liptovska	Y(2000)	N	N	Y(1994)	N	N
Mliekospol	Y(1999)	N	N	Y(1992)	Y(1992)	Y(1992)
Rajo	Y(2001)	N	Y/N	Y(1992)	N	N
Levicka	Y(1998)	N	Y(1998)	Y(0000)	N	Y(1998)
Tatranska	Y(2001)	N	Y(2000)	Y(0000)	N	N
Nutricia Dairy	Y(2000)	N	N	N	N	Y(2000)
<b>ROMANIA</b>						
Danone	Y		Y	Y		Y
Friesland	Y		Y	Y		Y
Promilch	Y		Y	Y		Y
Raraul	N		Y	Y		N

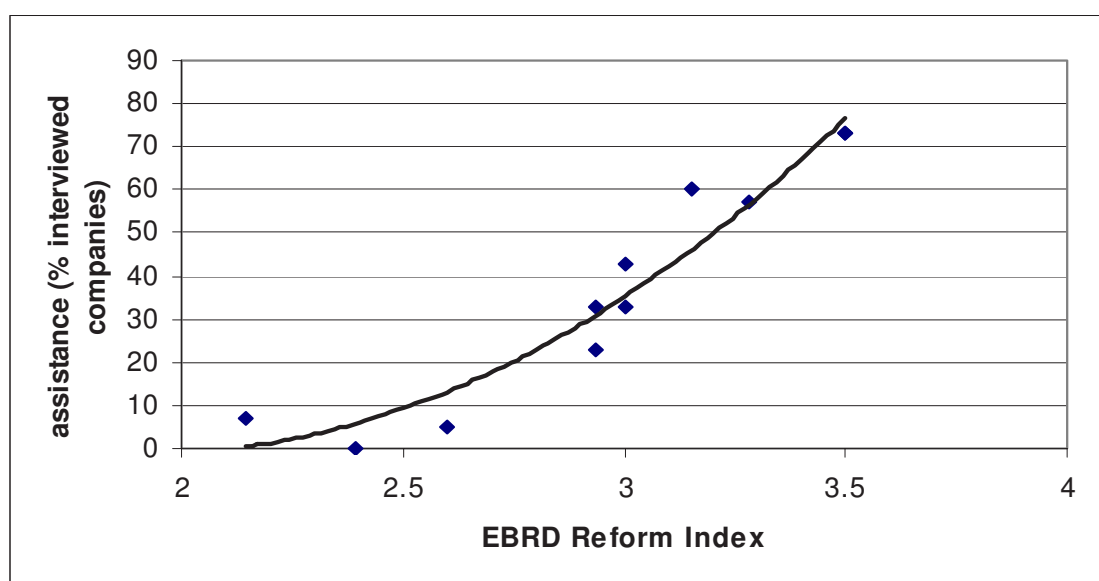
\* Either the company provides inputs and the farmer pays back later, or the company offers forward credit, which the farmer uses to buy inputs.

\*\* In Poland no distinction is made between credit for dairy-specific investments and general investments. Farm-level evidence shows that the dairy companies mainly support dairy-specific investments

Source: Swinnen, 2005

There is also significant growth of supplier support measures as part of the contracts and more farms are getting access to these. Credit, inputs, prompt payments, transportation, and quality control are the most commonly offered forms of support. Over 40% of processors in the CIS sample offer credit to at least some of the farms that supply them; and 36% offered inputs, in 2003. In several sectors, including the dairy sector in Poland, Bulgaria, Slovakia and Romania, farm assistance programs offered by private dairy companies are quite extensive and include credit provisions, input supply, extension services, and veterinary services and in some cases bank loan guarantees (table 3). Figure 1 shows how the growth of VC is closely and positively related to the reform process in transition countries.

**Figure 1: Impact of economic reforms on vertical coordination (\*) in the dairy sector of transition countries (\*\*)**



\* Share of dairy companies providing substantive assistance to farms as part of production contracts

\*\* Data based on surveys in Albania, Bulgaria, Poland, Slovakia (between 1994 and 2004)

Source: Swinnen, Dries, Germenji and Noev (2005)

In developing countries private VC is emerging and growing in many sectors. In South and Southeast Asia, there has been a sharp increase in VC of primary production with input suppliers and processing/exporting firms during the past 20 years (Gulati et al., 2005). Especially in animal production and dairy farming, VC is widespread. In SSA, private VC has become a dominant system of rural financing. For example, in Mozambique and Zambia it is virtually the only source of finance for agricultural households (IFAD, 2003). In Mozambique, an estimated 400,000 rural households, representing 12% of the rural population, are included in contract-farming (table 4). Also in Kenya and Zambia, a high number of rural households are producing agricultural commodities on contract with agro-industrial firms (table 4). The main crops that are grown under contractual arrangements in SSA include cotton, tobacco and horticulture crops. Also in Latin-America, VC is widespread over many different agricultural commodities and includes various contractual arrangements ranging from purely marketing contracts to production contracts with provision of inputs, credit, technical assistance and marketing assistance (table 5).



**Table 4: Contract-farming in Sub Sahara Africa**

Country	Commodity	Number of contracted smallholders
Kenya	tea	406,000
	sugar	200,000
	horticulture	15,000 - 20,000
	tobacco	> 10,000
Zambia	cotton	150,000
	tobacco	570
	horticulture	13,500
Mozambique	cotton	270,000
	tobacco	100,000

*Source: IFAD, 2003*

Finally, while private sector involvement has grown and the role of the government in agricultural production and marketing diminished, in several countries, especially in SSA, the government is still involved in agricultural supply chains, e.g. through minority or majority shares in privatized food processing companies, through state-owned banks and government credit schemes (sometimes as part of multipartite VC), provision of extension services, etc. Zambia is one of the only countries in SSA with almost complete absence of the government in production, marketing, regulation or direct financial contributions to the agricultural sector, although the government continues to play a major role in the distribution of fertilizers (IFAD, 2003).

**Table 5: Vertical coordination in Latin-American agri-food chains**

Product	Destination	Contracting					Vertical					
		Marketing	Technical assistance	Credit	Inputs	Management	Integration					
Tomato(paste)												
Nicaragua	Domestic	X					X					
Paraguay	Domestic											
Ecuador	Domestic											
Mexico	Domestic											
Peru	Domestic											
F&V												
Guyana	Domestic	X					X					
Ecuador	Domestic											
Trinidad & T	Domestic											
Mexico	Export							X	X	X	X	X
Guatemala	Export							X	X	X	X	X
El Salvador	Export	X	X	X	X	X						
Peru	Export	X										
Chicken												
Trinidad & T	Domestic	X	X	X	X	X						
Jamaica	Domestic	X	X									
Tobacco												
Chile	na	X	X	X	X							
Guatemala	na	X	X	X	X							
Sugarcane												
Nicaragua	Exp&Dom	X	X	X			X					
Guatemala	Exp&Dom						X					
Sesame Seed												
Nicaragua	Export	X			X							
Guatemala	Export	X										
El Salvador	Export											
Malt. barley												
Chile	Domestic	X	X	X								
Peru	Domestic	X	X									
Rice												
Trinidad & T	Domestic	X	X	X								
Paraguay	na	X	X									
Dominican R	na	X										
Dairy												
Trinidad & T	Domestic	X	X	X								
Jamaica	Domestic	X										
Ecuador	Domestic	X										

Source: Dirven (1996)

## COMMODITY SPECIFIC VERTICAL COORDINATION PATTERNS

In the *dairy* sector, we observe extensive production contracts between dairy processors and farms in transition countries, including the provision of credit, investment loans, animal feed, extension services, bank loan guarantees, etc. (Swinnen et al, 2006). This is different from the West since there is no production contracting going on in countries like the US. In South and Southeast Asia, VC in the milk sector involves contracts with cooperatively owned processing and marketing units, large scale state-owned processing companies and with the emerging private sector (Gulati et al., 2005).

In South and Southeast Asia, typical contract farming schemes in *animal production* involve feed millers who supply young animals, feeds, veterinary services and extension advice on credit to farmers who provide holding sheds, dispose of waste, and provide all required labour, water and electricity (Gulati et al., 2005). In Thailand nearly all commercially produced broilers are produced under contract arrangements with private companies (Gulati et al., 2005); and for the Philippines this is 80% (Delgado et al., 2003). These contract schemes are either based on fees per unit of product return for the farmer's labour, land, buildings, water and electricity; or on guaranteed prices.

In the *sugar* sector, we find, as in the developed economies, extensive marketing agreements, but the contracts are much more extensive in transition and developing countries, including also input provisions, investment loan assistance, etc. (Swinnen, Gow and Maviglia, 1999).

In *cotton*, the standard model in the US and Australia, two major cotton producers, is that the cotton (from seed to baled cotton) remains in ownership of the producer and the processing is paid for as a service. In transition countries and developing countries, the dominant player in the chain is the gin who typically contracts farms to supply seed cotton and provides them with a variety of inputs. This gin supply chain structure has developed in SSA countries as well as in Central Asia and involves quite extensive forms of private VC, with credit, seeds, irrigation, fertilizer, etc. being provided by the gins (Sadler, 2004). In Ghana e.g., the privatisation of the Ghana Cotton Development Board (who provided production inputs, extension services and guaranteed purchase of the supply to farmers under state-controlled VC) into the Ghana Cotton Company and market liberalization resulting in increased competition in the market has induced more extensive VC. Competing private companies have increased their services to farmers, including timely plowing services, reliable fertilizer and pesticide supplies, prompt payment after harvest and even plowing for farmers' food crops (Poulton, 1998).

In *fresh fruits and vegetables*, the rapid growth of modern retail chains with high demands on quality and timeliness of delivery is changing the supply chains in developing and transition countries. New supplier contracting is developing rapidly as part of retail investment and includes private VC with extensive farm assistance programs. In Africa, particularly in Kenya and Senegal, smallholder horticulture production under private contract arrangements has increased sharply after liberalisation but in recent years smallholder production is decreasing in favour of fully-integrated corporate horticulture farming (Maertens et al, 2006; Humphrey et al., 2004).

Traditional *tropical products* (coffee, tea, cocoa, rubber and oil palm) are traditionally grown on fully integrated large scale plantations because of large economies of scale in both production and marketing of these crops. However, these perennial crops are increasingly being grown by smallholders under contract farming arrangements and outgrower schemes. For example, cocoa in Ghana and Nigeria; rubber in Malaysia, Nigeria and Sri Lanka; coffee on the Ivory Coast, Kenya and Madagascar; oil-palm in West Africa and tea in Kenya and Malawi. In Kenya, half to the coffee is produced by smallholders (Baumann, 2000). Some of the largest outgrower schemes such as palm oil in the Philippines and rubber in Malaysia are state-controlled schemes involving parastatal companies while other schemes involve private VC. Some companies (and parastatals) combine large scale integrated production with contract farming and outgrower schemes in a 'nucleus estate' surrounded by outgrowers, especially when the economies of scale of the processing plant (such as for palm oil) depend on a certain volume of throughput. Contract farming provides farmers with inputs, new

technologies, credit and extension services, either private services or priority treatment from the public extension services as part of multipartite VC.

In *grains* VC is also elaborated and complex. In transition countries, there is extensive contracting going on for malting barley, but the VC is often much more extensive than in western countries, with brewing and malting companies vertically coordinating across several stages of the chain. Moreover, there is a remarkable amount of full vertical integration in wheat production in Russia and Kazakhstan, where large agro-holdings and grain trading companies own several large grain farms in some of the best grain producing regions, sometimes owning 100,000s of hectares. For example, large, vertically integrated grain companies are the dominant types of farming in the north of Kazakhstan. Also in Russia VC in grains has grown rapidly after 1998, but there it was the state which was the driving force behind the vertical coordination.

## THE EFFECTS OF EMERGING PRIVATE VERTICAL COORDINATION

The emergence of private VC is often mentioned as a new engine for economic growth, rural development and poverty reduction. In this section we review the empirical evidence on the impact of VC in transition and developing countries. We distinguish between efficiency effects and equity effects.

### *Efficiency effects*

The impact of private VC systems on productivity is difficult to quantify as several other factors affect output simultaneously and as company level information is difficult to obtain. Still, the evidence suggests that successful private VC has important positive effects, both direct and indirect.

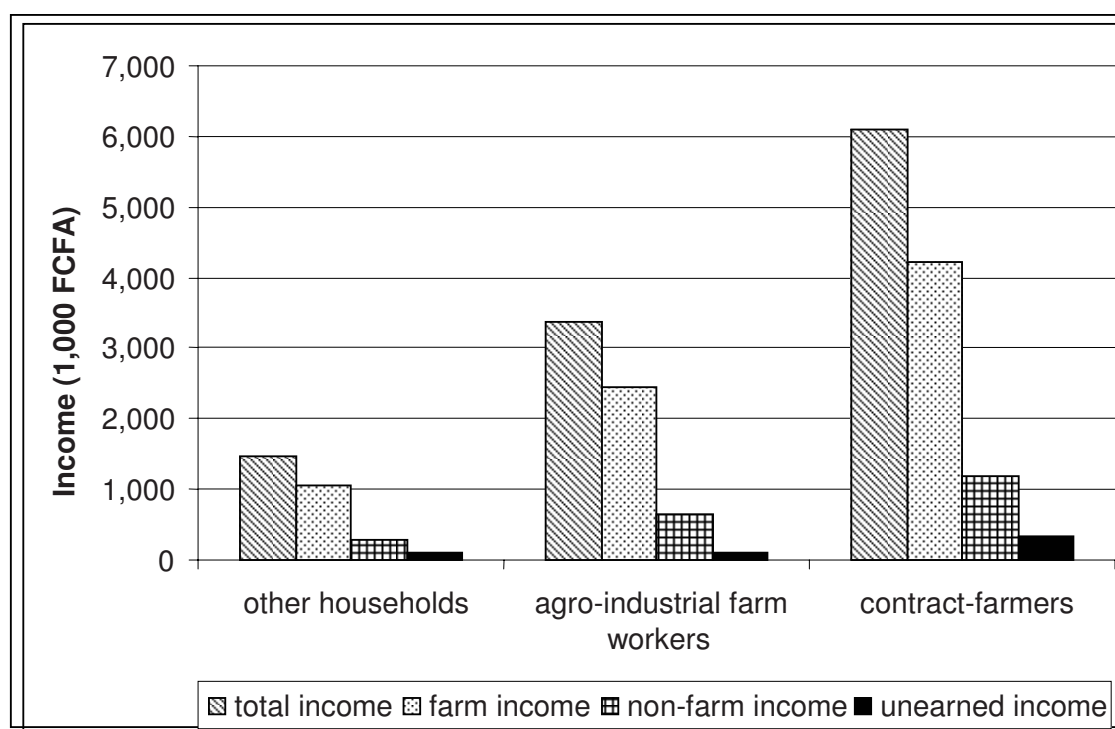
The direct impact is on the output and productivity of the processing company that initiates vertical contracting and of its suppliers involved in VC schemes. Supplying farmers have experienced beneficial effects on output, productivity, and product quality – and ultimately on incomes – through better access to inputs, timely payments, and improved productivity with new investments. Case studies indicate that private VC programs can lead to double digit annual growth in output and productivity. For example, case studies of the sugar and dairy sectors in East Europe show how new private contracts and farm assistance programs caused output, yields, and investments to grow dramatically (Gow et al, 2000; Dries and Swinnen, 2004; Swinnen, 2006). A major IFPRI-FAO study finds that contract broiler farmers are significantly more efficient and produce higher profits than independent farms in the Philippines and Thailand (Gulati et al., 2005). Moreover, farm profits are higher through lower production and marketing costs for contract farms compared to independent smallholders in VC schemes for milk, broilers and FFV in India (table 6). Maertens et al. (2006) find that the benefits from contract-farming in horticulture production in Senegal in terms of higher rural incomes are substantial (figure 2).

**Table 6: Production and transaction cost of milk, broiler and vegetable production in contract and non-contract farming in India (Rs/ton)**

Commodity	Contract farming			Non-contract farming		
	Production cost	Transaction cost	Total cost	Production cost	Transaction cost	Total cost
Milk	5,586	100	5,686	5,728	1,442	7,170
Broiler*	808	38	846	27,322	90	27,412
Vegetable**	1,485	35	1,520	1,630	437	2,067

*Note: For broiler, the firm provides free chicks, feed and medicines to the contract farmers. Vegetable costs refer to spinach.*

*Source: Birthal, Joshi and Gulati, 2005.*

**Figure 2: Household income (in 1,000 FCFA) from different sources for contracted and non-contracted horticulture households in Senegal**


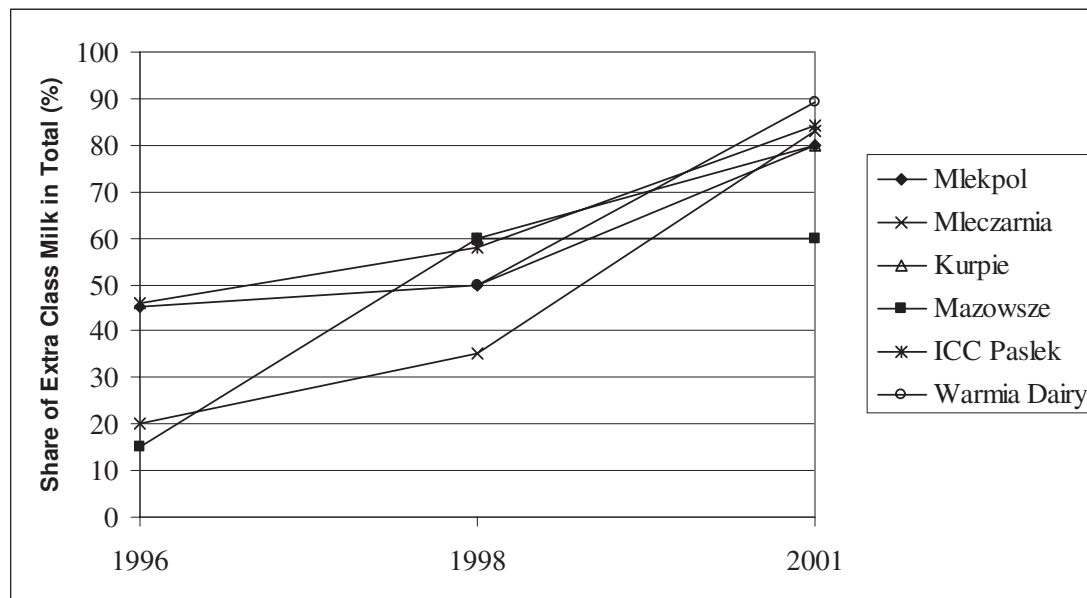
*Source: Maertens et al., 2006*

In their survey of CIS agri-business enterprise executives, White & Gorton (2004) concluded that various contract support measures had caused (separately) an average increase in yields of around 10 %. The measures with the greatest impact on yields were specialist storage (especially cooling equipment in the dairy sector), veterinary support and physical inputs. Specialist storage in the form of on-farm cooling tanks has been particularly important in raising yields and quality in the dairy sector, an effect also found in other countries (Dries and Swinnen, 2004). Market measures such as prompt payments, guaranteed prices, and market access also had large positive effects.

Quality of output also improved due to these measures. In the case of Polish dairy farms, milk quality rose rapidly following contract innovations by dairy processors in the mid 1990s. The share of the market held by highest quality milk increased from less than 30% on average in 1996 to around 80% on average in 2001 (figure 3). VC loans and loan guarantee programs contributed strongly to this by encouraging farm investments. In the Polish study, more than three quarters (76%) of all farmers in the

survey made investments in the past years, including many small farmers of less than 10 cows (Dries and Swinnen, 2004). Dairy loans are used for investments in enlarging and upgrading the livestock herd (30%) and cooling tanks (56%). Moreover, dairy assistance in the form of guarantees for bank loans helped farm investments. Also, programs which assist farms in accessing inputs (mainly feed) enhance investment indirectly by lowering input costs, or reducing transaction costs in accessing inputs, and consequently, through improved profitability.

**Figure 3: Share of extra class milk in total deliveries in Poland\***



\* Dairy companies in the North East of Poland

Source: Dries & Swinnen, 2004

Successful state-controlled VC programs exist. However, some case-studies point out that state-controlled VC is generally less effective in realizing farm productivity growth than private VC. For example, in Ghana, liberalisation of the cotton market and privatisation of the Ghana Cotton Company induced more extensive VC programs including timely plowing services, reliable fertilizer and pesticide supplies, prompt payment after harvest and even plowing for farmers' food crops (Poulton, 1998). As a result of improved farm assistance programs cotton production and yields increased dramatically (Poulton, 1998). Another example from the peanut industry in Senegal by Warning and Key (2002) illustrates this further. After independence in 1960 the state began the confectionary peanut program (ABP – *Arachide de Bouche Programme*) which grew into an outgrower scheme with 32,000 farmers providing peanuts destined for direct consumption. The ABP was completely privatised in 1990 and VC was extended from marketing contracts under state-controlled VC to production contracts in which the company handles all aspects of production, including selection and training of contracting farmers, provision of inputs, close monitoring of production, collection and processing of the harvest and export of the produce, mainly to the EU. Comparing the private ABP VC program with the state-controlled VC program of the majority state-owned company SONACAS for oil-peanut processing, reveals that this state-controlled VC program has much lower yields than the private VC program of ABP (800 kg/ha versus 1300 kg/ha) and that they have much lower credit repayment rates (58% compared to 98%). In addition, participation in the ABP program was found to significantly increase the income of farmers and improve their living conditions.



Indirect effects emerge through (1) cross-company spillover effects and (2) household and farm spillover effects.

Cross-company spillovers occur as firms competing for the same suppliers, and their fixed inputs, are forced to offer similar contractual arrangements. For example, in the case of the Slovak sugar sector, competition induced other sugar processors to introduce similar contracts. With some delay, this resulted in increases in productivity in the rest of the sugar sector. Other studies confirm the importance of this competition effect. Noev et al. (2004) and Dries et al. (2004) find that, respectively, in the case of the Bulgarian dairy sector and in contracting by modern retail companies in Croatia, competition for suppliers forces other companies to replicate farm assistance programs in order to secure supplies. This issue of competition and cross-company spillover effects is dealt with more explicitly in Swinnen and Vandeplas (this volume).

Household and farm spillovers occur as households' risk reduces; their access to capital increases and the productivity of non-contracted activities increases. First, VC does not only imply the provision of inputs, working capital and technical assistance to farmers, it also implies guaranteed sales, often at guaranteed prices. This comes down to decreased marketing risk for farmers. In addition, coordinating firms share in the production risk of farmers through ex ante provision of inputs and credit. Reduced production and marketing risks improves stability of farmers' income, which is an important benefit for farmers operating in high risk environments and in the absence of insurance markets<sup>38</sup>. Second, credit arrangements and prompt cash payments after harvest in VC programs improves farmer's cash flow and access to capital. This might ease farmers' financial constraints and benefit investment in other farm and non-farm activities. This effect is particularly important in the case of capital market imperfections. Third, contract-farming can lead to productivity spillovers on other crops, resulting from management advice, access to improved technologies, better input use, etc.

A number of empirical studies provide evidence for these household spillover effects. In a study on VC in South and Southeast Asia, Gulati et al. (2005) show that there is significantly less variation in yields and prices during the year for contract broiler farmers in India because they share risk with the contracted firm. A study on contracted vegetables in Uganda by Henson (2004) shows that there are important benefits for rural households from reduced risk and improved access to credit from vegetables production under contract in Uganda. Govereh and Tayne (2003) find important spillover benefits from VC in contracted cotton production on increased productivity on non-contracted activities.

Another illustrative example comes from Minten et al. (2006) on the FFV sector in Madagascar, one of the poorest countries in the world. The vast majority of FFV export from Madagascar goes through one company, who has regular contracts with five supermarkets chains in Europe. The company buys vegetables from more than 9,000 small farmers based on contracts. The firm provides seeds, fertilizer and pesticides and engages in intensive monitoring and extension advice. Farmers largely benefit from this contract production through a combination of effects. The firm teaches farmers better technologies and management practices, such as the use of compost, and this results in productivity spillovers on rice with yields being 64% higher on plots under contract. In addition, smallholders who participate in contract-farming have higher welfare, more stable incomes and shorter lean periods.

There are a number of studies specifically examining the motivations of farmers to engage in contract-production. These show that guaranteed sales and prices, access to inputs and credit are the most important motivations rather than direct income effects, which further proves the importance of household spillover effects from contract-farming. For example, table 7 shows how the dominant motivation for farms in Central Europe at the end of the 1990s was guaranteed access to markets (52% of the farms listed this as their primary motive) and to a lesser extent guaranteed prices (21%). The motivations for small cotton farmers in southern Kazakhstan to enter into contracts with gins are

<sup>38</sup> Guaranteed prices can also work counterproductive for farmers. For example, Gulati et al. (2005) point out that profits for contracted swine producers in the Philippines and Thailand were much lower than for independent producers in 2002. This was in part due to the strengthening of pork prices during the year, which did not benefit contracted farmers producing at guaranteed fixed prices.

mainly the improved access to credit (table 8). For FFV farmers in Senegal, guaranteed market access and access to inputs are the most important motivations for farmers to sign contracts while in Madagascar this is income stability and shorting of the lean period (table 9).

**Table 7: Contract Motivations for farms in Central Europe**

Most Important Reason for Contracting (%)	Czech 1999	Slovak 1999	Hungary 1997
Higher prices	9	8	10
Stable prices	7	22	33
Guaranteed sales	64	50	43
Pre-payment	7	13	3
Access to credit	0	0	9
Access to inputs and assistance	7	6	2
Other	6	2	0

Source: Swinnen, 2005

**Table 8: Contract Motivations for Cotton Farms in Kazakhstan, 2003**

Reason for contracting (%)	Yes	No	Most important reason
Guaranteed product sales	9	91	8
Guaranteed price	4	96	3
Access to pre-financing	81	19	75
Access to quality inputs	11	89	10
Access to technical assistance	0	100	0
Other	4	96	3

Source: Swinnen, 2005

**Table 9: Contract Motivations for FFV farms in Sub Sahara Africa**

Reasons for contracting (%)	Madagascar 2004	Senegal 2005
Stable income	66	30
Stable prices	19	45
Higher income	17	15
Higher prices		11
Guaranteed sales		66
Access to inputs & credit	60	63
Access to new technologies	55	17
Income during the lean period	72	37

Source: Minten et al., 2006; Maertens et al., 2006

### *Equity Effects*

There are two potential equity issues with VC processes. The first concerns the distribution of rents in vertically coordinated food supply chains. The second concerns the participation and exclusion of smallholders and poorer farmers in contract-farming.

First, VC implies sharing risks, costs and benefits between the coordinating firm – mostly food processors, exporters and retail chains – and farmers / suppliers. By introducing an interlinked contract, farms can access credit, inputs, etc. which were unavailable before and processing companies can have access to higher quality and timely supplies. Productivity and therefore income increases for the supply chain as a whole. However, a key question is who benefits from this increase in efficiency and total income? If the supplier and the processor benefit, both parties share in the gains from the institutional innovation, and everybody is better off. However, if the processing firm can set the terms of the contract such that it captures most or all of the rents, the productivity growth may not benefit the farms; and interlinking may even bestow additional monopoly power upon the processing company. Contract-farming has often been criticized as being a tool for agro-industrial firms and food multinationals to exploit unequal power relationships with farmers and extract rents from the chain (Warning and Key, 2002). However, our review of empirical evidence on the effects of VC presented above indicates that farmers do share importantly in the benefits of contract-farming and VC.

Second, the capacity of emerging VC in agri-food supply chains to serve as an engine of pro-poor economic growth critically depends on the types of farmers that are included in contract schemes. VC has the potential to affect the way income is distributed within a rural economy and can exacerbate existing patterns of economic stratification (Warning and Key, 2002). If agro-industrial firms prefer to contract with wealthier farmers, then poorer households will be excluded from direct benefits. There are three important reasons why this might be so. First, transaction costs favour larger farms in supply chains. Second, when some amount of investment is needed in order to contract with or supply to the company, small farms are often more constrained in their financial means for making necessary investments. Third, small farms typically require more assistance from the company per unit of output.

However, there are also reasons why agro-industrial firms do contract with smallholders and poorer farmers. First, the most straightforward reason is that companies have no choice. In some cases, small farmers represent the vast majority of the potential supply base. This is, for example, the case in the dairy sector in Poland and Romania, and in many other sectors in Eastern European countries (Swinnen, 2006). Second, case studies from transition countries suggest that company preferences for contracting with large farms are not as obvious as one may think. While processors may prefer to deal with large farms because of lower transaction costs in *e.g.* collection and administration, contract enforcement may be more problematic, and hence costly, with larger farms. Processors repeatedly emphasized that farms' "willingness to learn, take on board advice, and a professional attitude were more important than size in establishing fruitful farm-processor relationships". Third, in some cases small farms may have substantive cost advantages. This is particularly the case in labour intensive, high maintenance, production activities with relatively small economies of scale. Fourth, processors may prefer a mix of suppliers in order not to become too dependent on a few large suppliers.

Empirical studies and interviews with companies in Central and Eastern Europe and Sub Sahara Africa generally confirm the main hypotheses coming out of global observations: transaction costs and investment constraints are a serious consideration; and companies express a preference for working with relatively fewer, larger, and modern suppliers (Swinnen, 2006; Maertens et al., 2006). However, empirical observations show a very mixed picture of actual contracting, with much more small farms being contracted than predicted based on the arguments above. In fact, surveys in Poland, Romania and CIS find no evidence that small farmers have been excluded over the past six years in developing supply chains. In the CIS, the vast majority of companies have the same or more small suppliers in 2003 than in 1997 (Swinnen, 2006; World Bank, 2005). Also for the peanut sector in Senegal, no evidence was found for a bias in the participation of farmers in contract-schemes towards better-off households (Warning and Key, 2002).

A case-study on FFV exports from Senegal by Maertens et al. (2006) finds that relatively wealthier households have a better access to contracts with agro-exporting firms. However, the overall equity effects of VC are nuanced here. The export of FFV from Senegal to the EU have increased considerably during the past decade but due to increasingly stringent food standards, the VC system is changing since the past couple of years towards fully integrated production on agro-industrial holdings. This has decreased contract-farming and increased employment on agro-industrial farms. The study shows that contract-farming is biased to household with more land, livestock and other assets while employment in the agro-industry is not. The effects on income, from both contract-farming and agro-industrial employment are significantly positive but contract-farming has a large effect (figure 2). This suggest that, as smallholder contract-farming and large-scale industrial farming reach different groups of the poor, mixed VC systems are best suited to reduce adverse equity effects.